

4 significantly more windings than said lower coil and significantly greater size comprising

5 the steps:

6 shielding said upper coil from ambient magnetic field fluctuations not caused
7 by vibrations of said strings, and diverting said ambient magnetic field fluctuations so
8 as to be concentrated in said core ~~the vicinity~~ of said lower coil;

9 concentrating magnetic field fluctuations caused by vibrations of said strings
10 (string flux) in said upper coil and shielding said lower coil from said string flux; and

11 subtracting the signal generated in said lower coil from the signal generated in
12 said upper coil.

REMARKS

1 Claims 9, 12 and 13 were objected to as referring to withdrawn claims. In response,
2 these claims have been rewritten in independent form to incorporate the limitations of
3 there parent claims.

4 Claim 3 was rejected as indefinite. In response, the reference to the prior art was
5 removed and limitations describing the structure were substituted.

6 Claims 1, 3, 9, 17 and 18 have been rejected as anticipated under 35 USC 102 by US
7 5,811,710 (Blucher). In response to this rejection, claim 1 has been amended to specify
8 that the lower coil is significantly smaller and has fewer windings than the upper
9 winding, and to specify that the flux transfer plate means injects noise flux directly into
10 the core of the lower coil. There is no teaching in Blucher that the lower coil is
11 significantly smaller and has fewer windings than the upper coil. In fact, the drawings of
12 Blucher at Figures 2 and 4 show the upper coil and lower coil to be the same size.

13 The advantage of having the upper coil in the claimed invention be larger is that it can

14 have significantly more turns which allows it to pick up significantly more string signal.
15 Its larger size causes the upper coil in the invention to also pick up more unwanted hum
16 signal. This hum signal is eliminated or reduced by the fact that the smaller lower coil has
17 its efficiency in picking up hum signal increased by the flux transfer plates which guide
18 flux variations constituting unwanted hum into the very core of the lower coil which is
19 the most efficient place to inject the hum signal. This cause the smaller size lower coil to
20 still cancel all or most of the hum in the larger upper coil while still being smaller in size.
21 The smaller size lower coil allows the combination structure to still be small which is
22 advantageous because it can frequently fit into the cavities of older guitars with single
23 coil pickups.

24 In addition, the flux transfer plate means in claim 1 is stated in means plus function
25 form. That means that it must be interpreted in accordance with the teachings in the
26 specification of structure which perform the stated function of diverting magnetic flux in
27 an ambient magnetic field away from the upper coil means and into a core of the lower
28 coil means. The specification and drawings show the flux transfer plate means 26 in
29 Figure 3 to form a continuous, uninterrupted path from a place adjacent the side walls of
30 the upper coil where noise flux headed for the upper coil is intercepted. This noise flux
31 is diverted down into the core of the lower coil by the continuous, interrupted material of
32 the flux transfer plate which represents the path of least resistance for the magnetic flux
33 as opposed to air. There are no air gaps in this path. Air gaps, even the smallest of
34 ones, are very lossy where magnetic flux transfer is concerned. The continuous flux
35 transfer plates represent a high efficiency flux transfer mechanism to transfer the noise
36 flux into the heart of the lower coil, and this high efficiency allows use of the asymmetrical
37 coil geometry. Without these high efficiency flux transfer plates, with the smaller lower
38 coil, there would be insufficient noise signal induced in the lower coil to cancel out the

39 noise signal in the upper coil.

40 The Blucher prior art pickup would not function properly if its lower coil were
41 significantly smaller than the upper coil because it lacks the high efficiency flux transfer
42 plates. It would therefore have insufficient noise signal in the lower coil to cancel out
43 noise in the upper coil.

44 The Blucher prior art pickup also does not teach an air gap between the magnetic
45 pole pieces of the upper coil and the permeable core of the lower coil as is present in the
46 invention of claim 1. The air gap being referred to here is air gap 46 in Figure 5. This air
47 gap is part of the upper coil means. This air gap further isolates the lower coil from the
48 upper coil so that less string signal gets picked up in the lower coil, which is a desirable
49 trait since any string signal picked up in the lower coil cancels part of the desired string
50 signal picked up in the upper coil.

51 Furthermore, Blucher does not teach a wrap around ferro-magnetic plate, only one
52 with two vertical walls and which leaves the ends of the upper coil open and exposed to
53 noise flux. In contrast, with reference to Figure 1, note how the flux transfer plates 24
54 and 26 (flux transfer means in claim 1) wrap around the ends of the upper coil to shield
55 those ends from noise flux.

56 Furthermore, Blucher does not teach a lower coil form (10 in figure 1 - lower coil
57 means in claim 1) which is made of ferrous material nor does anybody else. The claimed
58 invention teaches that the lower coil form can be either ferrous or non ferrous in the
59 following passage from page 7 of the specification.

60 A lower coil form 10 serves as a bobbin around which a lower winding (not
61 shown) is wound to form the lower coil. The lower coil form 10 has a slot 22
62 formed therein in which a ferrous blade 12 is inserted when the pickup is
63 assembled. The lower coil form 10 can be made of injection molded plastic,
64 glass reinforced nylon or any other non ferrous or ferrous material. The
65 preferred material for the lower coil form 10 is glass reinforced nylon which is
66 a form of injection molded plastic. The lower coil form 10 does not have to be

67 non ferrous, and it can be made of other ferrous materials such as ferrite,
68 molded powdered metal, a mix of polyurethane with iron filings or Metal Injection
69 Molded steel. In one alternative embodiment discussed below, the bottom coil
70 form 10 and flux transfer plate (24 and 26 in the embodiment of Figure 1) is
71 formed of ferrous material so as to be all one piece.
72 Also in response to this rejection, claim 3 has been amended to specify that the lower

73 coil has a significantly smaller winding cross-sectional area than the upper core, and to
74 specify that the flux transfer plates inject noise flux into the core of the smaller lower
75 coil.

76 Also in response to this rejection, claim 9, in addition to be amended to be in
77 independent form has also been amended to eliminate the indefiniteness problem and
78 further amended to specify a smaller lower coil than upper coil and flux transfer plates
79 which inject noise flux directly into the core of the lower coil.

80 Claim 17 has been amended in response to the anticipation rejection to specify the
81 upper coil as significantly larger than said lower coil and to specify that the flux transfer
82 plates inject the noise flux into the core of the lower coil.

83 Claim 18 has been amended in response to this rejection so as to specify in the
84 apparatus limitations of the preamble of this method claim that the upper coil has
85 significantly greater size and number of windings than the lower coil and the flux
86 transfer plate diverts noise flux into the core of the lower coil.

87 Claims 2, 4 and 16 were rejected as obvious over the combination of Blucher et al. in
88 view of Stich (US 5,789,691).

89 A difference that this invention enjoys over the prior art two coil pickups is that the
90 prior art two coil pickups have upper and lower coils of the same size whereas the
91 claimed invention has an upper coil which is larger than the lower coil in that the cross
92 sectional area of the windings of the upper coil is significantly larger (more turns) than
93 the cross-sectional area of the windings of the lower coil. The reason this is significant

94 is that the larger upper winding allows the two coil pickup of the invention to pick up more
95 string signal and have sonic characteristics which are very similar to the prior art single
96 coils while still enjoying significantly reduced hum signal. The reduced hum signal is
97 provided by the efficient injection of noise flux into the lower coil by the flux transfer
98 plates. This more efficient injection of noise flux into the lower coil means better noise
99 cancellation characteristics.

100 The Stich prior art patent does not teach a hum cancelling pickup. It is a single coil
101 design which is wound continuously on two sections of the same bobbin. The sections
102 of the bobbin are of unequal size with the intention of providing a "tapped" single coil
103 design with two sections of radically different resonant frequencies. Both coils are fully
104 engaged in the detection of the string signal which is exactly the opposite of the desired
105 result in the claimed invention. Thus, one skilled in the art would be led away from the
106 claimed combination by the teachings of Stich, and this is the antithesis of obviousness.

107 Additionally, Stich puts the smaller of the two coils on top which exactly the opposite
108 of what the claimed invention. In the claimed invention, the inventor wants the smaller
109 coil as far away from the strings as possible. Stich's reasoning is not applicable to the
110 claimed invention, and Stich does not teach that he is trying to solve the problem of
111 ambient noise reduction. Stich teaches in the abstract his purpose: "Substantially
112 eliminate distortion and harsh sounding overtones by the reduction of mutual
113 inductance..." In Col. 3, lines 17-35, Stich teaches his design goals, and none of them is
114 about quiet operation or hum-cancellation.

115 The Examiner cites Stich for its teaching of a trim pot. However, the trim pot of the
116 Stich invention is not used for the purpose of balancing or minimizing hum and noise,
117 especially since his pickup is not hum-cancelling. The purpose of the trim pot, as stated
118 in the Stich patent, is to "allow the player of the instrument to gradually adjust the

119 inductance and to reduce and shift the resonance peaks..." (col. 1, 12-15). Stich also
120 teaches at Col. 9, lines 48-59 that the variable resistor is for the control of eddy currents.

121 Stich describes his inventions as "2 coils (or coil segments) which are in-phase with
122 each other..." (Col. 9, 36-42). This is exactly the opposite of what the claimed invention
123 does with the second lower coil which is wired to be out of phase with the first larger
124 coil so as to cancel hum signal. This teaches away from the claimed combination and
125 does not render it obvious.

126 If Stich and Blucher were to be combined, the two coil design of Blucher would be
127 modified to have a smaller upper coil instead of the smaller lower coil of the claimed
128 invention, and there would be no wrap around flux transfer plates that conduct noise into
129 the now larger lower coil. The small upper coil would be picking up string signal, but the
130 lower coil would also be picking up a large amount of the string signal due to its close
131 proximity to the strings. The large string signal present in the lower coil, when combined
132 in the aforementioned out of phase relationship with the upper coil, would tend to cancel
133 a large percentage of the string signal in the upper coil, leaving a string signal with weak
134 output. Further, if the Blucher shield plates were to be employed, shielding the small
135 upper coil from noise flux, it would be virtually impossible to effectively cancel noise
136 because of imbalanced contributions from the upper and lower coils. This entire
137 arrangement is exactly the opposite of the teachings of the present invention. The
138 combination of Stich and Blucher teach away from the claimed invention, not toward it.

139 These differences over the prior art are present in claim 2 because claim 2 depends
140 from claim 1 and claim 1 has been amended to specify the lower coil means has a smaller
141 size than the upper coil means. In addition, the flux transfer means of claim 1 has been
142 amended to specify that the noise flux is guided into the core of the lower coil means.

143 Claim 4 depends from claim 3 which has been amended to specify that the lower coil

144 winding is significantly smaller in cross-sectional area than the upper coil winding and
145 the flux transfer plate means functions to guide noise flux into the core of the lower coil.
146 Further, claim 4 has been further amended to specify that the lower coil is not shielded
147 from ambient noise flux whereas the upper and lower plates of the upper coil form have
148 electrostatic, non ferrous shielding material thereon.

149 Claim 16 has been amended to specify that the lower coil form is substantially smaller
150 than said upper coil form and the lower coil winding is substantially smaller in cross-
151 sectional area and windings than the upper coil. The flux transfer plate limitation has also
152 been amended to specify the noise flux is guided into the core of the lower coil.

153 The larger size of the upper coil also means the lower coil is further away from the
154 strings so the lower coil picks up less string signal and therefore cancels less string
155 signal. The smaller size of the lower coil also makes it less efficient in picking up string
156 signal, or any signal for that matter. This is why the flux transfer plates are used to
157 guide noise flux into the lower coil core.

158 The Blucher et al. reference (5,811,710) teaches upper and lower coils which are the
159 same size. Further, there is no flux transfer plate which guides the noise flux into the
160 core of the lower coil. Therefore, the Blucher et al. reference does not anticipate the
161 now amended rejected claims 1, 3, 9, 17 and 18, and the combination of Blucher et al.
162 with Stich does not render claims 2, 4 or 16 obvious.

163 Claim 10 has been voluntarily amended to remove an incorrect limitation regarding
164 shielding the upper coil from the lower coil.

165 Claim 4 has been voluntarily amended to add electrostatic, non ferrous shielding to the
166 upper and lower plates of the upper coil form. This shielding helps keep high frequency
167 harmonics from power lines and modern electronic devices out of the upper coil.

168 Claim 5 has been voluntarily amended to specify an air gap between said upper coil

169 form permanent magnets and said lower coil form core to reduce the amount of string
170 signal flux that gets into said lower coil form.

171 Claims 5, 12 and 13 have been rejected under 35 USC 103(a) as being unpatentable
172 over Blucher et al. Claim 5 calls for alnico magnets. Claim 12 calls for ferrous material
173 for the flux transfer plates. Claim 12 has been rewritten to independent form to recite the
174 limitations of its original parent claim, but those limitations have been amended to recite a
175 smaller lower coil winding and flux transfer plates that guide noise flux along a
176 continuous path with no air gaps into the core of the lower coil. Claim 13 has been
177 rewritten to independent form to add the limitations of the parent claim but eliminating the
178 phrase which was rejected as indefinite and adding limitations along the same lines as
179 the amendments to claim 12.

180 Given the fact that claim 5 depends from claim 3 which has been amended to recite
181 several significant differences over Blucher, the equivalence of alnico magnets to other
182 materials is now moot for purposes of obviousness. Given that claim 12 has been
183 amended to recite the smaller lower coil and the flux transfer plates guiding noise flux
184 into the core of the lower coil, the equivalence of the materials for the flux transfer plates
185 is moot in terms of obviousness. Given that claim 13 has been amended to recite the
186 smaller lower coil and the flux transfer plates guiding noise flux into the core of the lower
187 coil, the equivalence of the materials is moot in terms of obviousness.

188 Claim 10 was rejected as obvious over the combination of Blucher with Kinman
189 (5,668,520). Claim 10 depends from claim 3 which has been amended to recite a lower
190 coil which is smaller than the upper coil, and to specify the flux transfer plates guide the
191 flux into the core of the lower coil winding. Claim 10 itself specifies details about the flux
192 transfer plates.

193 The Examiner cites Kinman for its teaching of a second set of vertical walls in the flux

194 transfer plates. The Kinman shielding system differs from the claimed shielding system in
195 several key respects.

196 First, the Kinman shielding system covers the outside of both the upper and lower
197 coils with magnetic shielding. This approach would not work in the claimed invention
198 because it would not allow the use of asymmetrical coil geometry. In the claimed
199 invention, only the outside of the upper coil is shielded by the flux transfer plates, and
200 then the flux transfer plates transition to go into the core of the smaller lower coil thereby
201 leaving it exposed to the ambient noise flux while shielding the upper coil from the
202 ambient noise flux.

203 Second, unlike the claimed invention, Kinman does not couple the upper shield directly
204 into the core of the lower coil and therefore he does not enhance the noise and hum level
205 in the lower coil. In Kinman's technology, enhancing the hum and noise signal in the
206 lower coil would not work. Therefore, Kinman teaches away from the claimed invention
207 since one skilled in the art would not perceive a likelihood of success in adapting Kinman
208 to Blucher and trying to enhance the noise and hum level in the lower coil.

209 The intention of Kinman's shielding system is to "inductively and magnetically decouple
210 (the coils) from one another by the shield" (Col. 2, 43-45)

211 Kinman's lower coil pole pieces do not all extend fully to the top of the lower coil, so
212 they would not be able to couple the ambient field flux carried by the upper shield into the
213 core of the lower coil. (Col. 2, 65-67)

214 Kinman's design requires impedance matched coils (Col. 2, 51-52). The claimed
215 invention does not require impedance matched coils and would not function properly if
216 the coils were impedance matched.

217 It is essential in the Kinman design that both coils be contained within the shields (Col.
218 3, 4-17; col. 3, 42-45). This teaches away from the claimed invention since in the

219 claimed invention, it is important to have the upper coil shielded from noise flux but not the
220 lower coil.

221 Kinman teaches impedance matching is important to his design, and his coils have
222 between 1000 and 7000 turns per coil. In the claimed invention, the opposite is true. The
223 upper coil has between 8100 and 8600 turns while the lower coil only has 3100 to 3500
224 turns so impedance matching does not exist in the claimed invention.

225 No other manufacturer of guitar pickups has devised the unique combination of coil
226 size and shielding features which distinguish the claimed invention over the prior art:
227 Using only the teachings of the prior art, which the Examiner is required to so to support
228 the prima facie rejections, it would be unlikely that a person skilled in the art would make
229 the claimed invention because of teaching away and technological incompatibility.

230

Respectfully submitted,

Ronald C. Fish

Ronald Craig Fish

Reg. No. 28,843

Tel 408 778 3624

FAX 408 776 0426

Dated: November 2, 2005

I hereby certify that this correspondence is being deposited with the United States
Postal Service as First Class Mail, postage prepaid, in an envelope addressed to:
Commissioner for Patents, P.O. Box 1450, Alexandria, Va. 22313-1450.

on 11/2/05
(Date of Deposit)

Ronald C. Fish

Signature of Depositer